

## Thomson, Wallace A.

The photo-electric cell and electric clock as a means of recording the daily hours of bright sunshine. p. 299-303. illus. 1931. (Repr. Canadian journal of research. 4. March 1931.)

## Thomson, Wallace A.

The photo-electric measurement and photographic recording of daylight. p. 559-564. diagr. 25½ cm. (Repr. Canadian jnl. of research. 4. 1931.)

## Vaughan, Thomas Wayland

Report on oceanography at the Fifth Pacific science congress, Victoria and Vancouver, British Columbia, June 1-14, 1933. n.d. 27 p. 28 cm. [Mimeographed.]

## Walther, Johannes

Das Gesetz der Wüstenbildung in Gegenwart und Vorzeit. 4. neubearb. Aufl. Mit 203 Abbildungen. Leipzig. 1924. 421 p. illus., front. 23½ cm.

## Woodman, J. Edmund

The flying weather of New York. A statement of the problem. (Preliminary studies of the flying weather of New York. No. 1. New York, March 1932.) 17 p. 29½ cm. (New York univ. College of Engineering. The Guggenheim school of aeronautics. Contributions from the laboratories of aeronautical meteorology.) [Manifolded.]

## Zi-Ka-Wei. Observatoire météorologique

Bulletin, aérologique. Température. 1932. Données thermométriques obtenues sur la ligne aérienne: Shanghai-Chung-king. (China national aviation corporation. Valeurs moyennes et valeurs minima absolues . . . Zi-Ka-Wei. n.d. 8 p. tables. 31 cm.

## Zsigmond, Róna

Meteorológiai megfigyelések kézikönyve. (A magyar meteorológiai társaság kiadványa.) Budapest. 1925. 191 p. illus., pl., tables (1 fold.), diagr. 24½ cm.

## SOLAR OBSERVATIONS

By IRVING F. HAND, Assistant in Solar Radiation Investigations

For a description of instruments employed and their exposures, the reader is referred to the January 1932, REVIEW, page 26.

Table 1 shows that solar radiation intensities averaged above normal for October at all three Weather Bureau stations.

Table 2 shows an excess in the total solar radiation received on a horizontal surface at all stations for which normals have been computed, with the exception of Twin Falls and Miami.

Since the installation of a new blast furnace by the Research Corporation on the campus of the American University, smoke and gases have at times so vitiated the

TABLE 1.—Solar radiation intensities during October, 1933

(Gram-calories per minute per square centimeter of normal surface)

## WASHINGTON, D.C.

Date	Sun's zenith distance											Local mean solar time
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon	
	75th mer. time	Air mass										
		A.M.					P.M.					
		e.	5.0	4.0	3.0	2.0	1.0 <sup>1</sup>	2.0	3.0	4.0	5.0	
Oct. 2	<i>mm</i> 8.48	<i>cal</i> 0.75	<i>cal</i> 1.00	<i>cal</i> 1.15	<i>cal</i> 1.27	<i>cal</i> 1.26	<i>cal</i> 1.26	<i>cal</i> 1.11	<i>cal</i> 1.00	<i>cal</i> 0.87	<i>mm</i> 7.57	
Oct. 5	10.59		.44								9.83	
Oct. 6	7.57	.91	1.03	1.16	1.31	1.49	1.33	1.11	1.00	0.87	6.76	
Oct. 7	6.76	.73	.94	1.02	1.18	1.44					8.18	
Oct. 10	7.87	.68	.83	.99	1.10						6.02	
Oct. 12	8.18				1.04						10.59	
Oct. 14	6.02		.96	.99							4.17	
Oct. 19	6.02			1.10							4.95	
Oct. 20	6.27				1.06						8.18	
Oct. 26	2.74	.94	1.05	1.12	1.30		1.16	1.02			3.30	
Oct. 27	4.75						1.12	.98			6.27	
Oct. 30	6.27	.44	.66	.85							9.73	
Oct. 31	8.48	.56	.64	.82	1.04						10.97	
Means		.72	.84	1.02	1.16	(1.46)	1.22	1.04	(1.00)	(.87)		
Departures		-.03	±.00	+.06	+.04	+.05	+.09	+.10	+.19	+.15		

## MADISON WIS.

Oct. 2	5.16	—	0.99	1.18	1.33	1.52	—	—	—	—	4.95
Oct. 3	5.56	—	.88	—	—	—	—	—	—	—	6.27
Oct. 4	7.04	—	—	—	1.23	—	—	—	—	—	7.29
Oct. 5	6.50	—	.83	—	1.21	1.52	—	—	—	—	7.04
Oct. 11	7.29	—	—	1.07	—	—	1.27	—	—	—	7.09
Oct. 12	5.36	.98	1.08	1.20	—	—	—	—	—	—	4.17
Oct. 13	4.57	.86	.94	—	—	—	—	—	—	—	4.37
Oct. 18	4.57	—	—	—	1.34	1.54	—	—	—	—	3.30
Oct. 25	2.74	1.06	1.11	1.18	—	—	—	—	—	—	2.87
Oct. 30	9.47	—	.68	.89	1.08	—	1.10	—	—	—	11.38
Oct. 31	10.21	—	.66	.79	.87	1.12	—	1.13	—	—	11.81
Means	—	.89	.91	1.06	1.22	1.53	1.17	—	—	—	—
Departures	—	+.11	-.01	+.02	+.03	+.09	-.02	—	—	—	—

1 Interpolated.

TABLE 1.—Solar radiation intensities during October, 1933—Con.

## LINCOLN, NEBR.

Date	Sun's zenith distance										Local mean solar time	
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		Noon
	75th mer. time	Air mass										
		A.M.					P.M.					
		e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0		5.0
Oct. 1	<i>mm</i> 5.79	<i>cal</i>	<i>cal</i>	<i>cal</i>	<i>cal</i>	<i>cal</i> 1.54	<i>cal</i> 1.32	<i>cal</i> 1.14	<i>cal</i> 1.03	<i>cal</i> 0.93	<i>mm</i> 4.17	
Oct. 2	5.36		1.06	1.23	1.35	1.46					4.57	
Oct. 4	7.57	0.87	.98	1.10	1.28	1.39	1.29	1.14	1.00	.88	6.76	
Oct. 5	5.79	.76	.84	1.04	1.28	1.49	1.26	1.07	.92	.82	7.29	
Oct. 6	6.50	.84	.98	1.10	1.29	1.54					4.57	
Oct. 7	4.37	.98	1.06	1.20	1.36	1.59					4.17	
Oct. 9	4.37	.67	.82	.87	1.19	1.52	1.34	1.16	1.07	.96	5.16	
Oct. 10	5.16					1.51	1.23	1.00	.90	.82	6.76	
Oct. 11	6.27	.71	.85	1.01	1.20	1.40					5.36	
Oct. 12	4.17		.92	1.05	1.38						4.75	
Oct. 13	4.17		.94		1.30	1.46	1.20	1.01	.85	.73	5.36	
Oct. 16	5.36		1.11	1.24							4.57	
Oct. 26	4.96				1.18				1.00	.90	5.16	
Oct. 28	6.76	.70	.88	1.03	1.18		1.18	1.01	.86	.75	7.57	
Oct. 29	4.75						1.15	.94	.80	.70	10.21	
Oct. 30	10.59	.70	.82	.98	1.14						10.59	
Oct. 31	11.35		.85	1.01	1.21						11.38	
Means		.78	.93	1.08	1.26	1.49	1.25	1.06	.94	.83		
Departures		-.06	-.01	-.02	-.02	+.01	+.00	-.02	-.01	-.01		

## BLUE HILL, MASS.

Oct. 2	9.8	—	—	—	—	1.15	1.02	—	—	—	9.0
Oct. 3	6.3	—	—	—	1.10	—	—	—	—	—	5.7
Oct. 6	9.5	—	—	—	—	—	.97	—	—	—	8.3
Oct. 8	7.9	—	—	1.24	1.40	—	1.26	1.14	1.00	—	7.1
Oct. 10	9.1	—	—	1.01	1.22	—	1.20	—	—	0.68	5.4
Oct. 11	7.3	—	—	—	1.27	—	—	—	—	—	6.9
Oct. 12	9.5	—	—	1.00	1.09	—	1.02	.83	—	—	9.5
Oct. 14	4.4	—	—	—	1.33	—	1.37	1.28	1.19	—	4.1
Oct. 15	4.4	—	—	1.19	1.29	—	1.26	1.05	.91	.79	4.0
Oct. 16	7.0	—	—	—	—	—	1.28	1.11	.97	.85	6.8
Oct. 18	5.8	—	—	—	1.23	—	—	—	—	—	3.3
Oct. 19	4.6	—	—	—	1.35	—	1.21	.74	—	—	3.0
Oct. 21	4.4	—	—	—	1.30	—	—	—	—	—	5.5
Oct. 25	5.0	—	—	1.16	—	—	—	—	—	—	2.9
Oct. 26	2.7	—	—	—	1.38	—	1.37	1.11	1.01	—	1.7
Oct. 29	3.7	—	—	—	1.37	—	—	—	—	—	1.7
Oct. 30	3.4	—	—	1.17	1.17	—	—	.94	.77	—	4.7
Oct. 31	5.0	—	—	.81	.89	—	—	.49	—	—	7.5
Means	—	—	—	1.08	1.24	—	1.19	.97	.68	.77	—

\*Extrapolated.

atmosphere as seriously to interfere with normal-incidence measurements, as shown in table 3.

Polarization measurements made on 5 days at Washington give a mean of 59 percent with a maximum of 63 percent on the 10th. At Madison, measurements made on 6 days give a mean of 69 percent with a maximum of 76 percent on the 2d. These values are slightly higher than the October normals at both stations.

TABLE 2.—Average daily totals of solar radiation (direct+diffuse) received on a horizontal surface

Week beginning—	Gram calories per square centimeter														
	Washing- ton	Madison	Lincoln	Chicago	New York	Fresno	Pitts- burgh	Fair- banks	Twin Falls	La Jolla	Gaines- ville	Miami	New Orleans	River- side	Blue Hill
1933	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
Oct. 1.....	382	353	432	344	327	437	242	138	438	308	330	324	404	439	cal. 259
Oct. 8.....	343	266	388	286	299	407	206	102	398	196	-----	452	400	340	327
Oct. 15.....	292	196	306	167	250	417	230	86	346	382	317	360	250	411	325
Oct. 22.....	257	185	324	158	199	389	172	89	274	220	260	372	328	329	189
Departures from weekly normals															
Oct. 1.....	+50	+80	+102	+114	+47	+10	-16	-----	+22	+14	-----	-156	-----	-----	-----
Oct. 8.....	+35	+23	+83	+83	+51	+56	-10	-----	+17	-78	-----	+50	-----	-----	-----
Oct. 15.....	+14	-28	1	-15	+36	+40	+38	-----	-12	+115	-----	-52	-23	-----	-----
Oct. 22.....	-10	-16	+49	-3	+7	+19	-9	-----	-41	-48	-----	-79	+3	-----	-----
Accumulated departures on Oct. 29															
	+7,567	-1,442	+5,516	+13,650	+9,086	+9,590	-1,659	-----	+609	+9,247	-----	-4,984	-----	-----	-----

TABLE 3.—Solar radiation measurements, and determinations of atmospheric-turbidity factor,  $\beta$ , Washington, D.C., October 1933

[Values in italics have been interpolated]

Date and solar- hour angle	Solar altitude, h	Air mass, m	$I_m$	$I_r$	$I_s$	$\beta$	Blue- ness of sky	Atmos- pheric dust partic- les per cubic centi- meter	Notes: Sky- light polar- ization, P, clouds, etc.
Oct. 3									
4:32a.....	14-20	4.00	1.005	<i>0.792</i>	<i>0.645</i>	<i>0.035</i>	-----	548	
4:27a.....	15-16	3.74	1.038	<i>.796</i>	<i>.647</i>	<i>.045</i>	-----		
4:09a.....	18-34	3.12	1.107	<i>.739</i>	<i>.691</i>	<i>.060</i>	-----		
4:04a.....	19-28	3.02	1.137	<i>.741</i>	<i>.691</i>	<i>.055</i>	-----		
3:51a.....	21-25	2.72	1.190	<i>.779</i>	<i>.715</i>	<i>.055</i>	-----		
3:46a.....	22-40	2.58	1.208	<i>.782</i>	<i>.718</i>	<i>.055</i>	-----		
3:00a.....	30-22	1.98	1.270	<i>.927</i>	<i>.738</i>	<i>.070</i>	-----		
2:55a.....	31-10	1.93	1.306	<i>.930</i>	<i>.743</i>	<i>.060</i>	-----		
Oct. 6									
4:24a.....	15-00	3.82	1.053	<i>.800</i>	<i>.655</i>	<i>.040</i>	-----	855	
4:18a.....	16-06	3.57	1.083	<i>.803</i>	<i>.668</i>	<i>.040</i>	-----		
3:53a.....	20-35	2.82	1.190	<i>.867</i>	<i>.709</i>	<i>.045</i>	-----		
3:46a.....	21-49	2.69	1.198	<i>.870</i>	<i>.712</i>	<i>.055</i>	-----		
2:56a.....	30-06	2.00	1.312	<i>.852</i>	<i>.749</i>	<i>.055</i>	-----	6	P=60.4%
2:52a.....	30-43	1.95	1.342	<i>.955</i>	<i>.752</i>	<i>.045</i>	-----		
1:48a.....	39-42	1.57	1.407	<i>.991</i>	<i>.786</i>	<i>.090</i>	-----		
1:43a.....	39-58	1.57	1.380	<i>.894</i>	<i>.791</i>	<i>.080</i>	-----		
0:26a.....	45-34	1.40	1.372	<i>.899</i>	<i>.791</i>	<i>.090</i>	-----		
0:20a.....	45-43	1.39	1.392	<i>1.000</i>	<i>.794</i>	<i>.090</i>	-----		
Oct. 7									
4:31a.....	13-29	4.24	.934	<i>.747</i>	<i>.597</i>	<i>.060</i>	-----	1,367	
4:24a.....	14-46	3.87	.957	<i>.750</i>	<i>.600</i>	<i>.065</i>	-----		
4:15a.....	16-24	3.51	1.014	<i>.770</i>	<i>.636</i>	<i>.065</i>	-----		
4:11a.....	17-06	3.37	1.045	<i>.773</i>	<i>.639</i>	<i>.055</i>	-----		
3:55a.....	19-58	2.90	.996	<i>.737</i>	<i>.649</i>	<i>.095</i>	-----		
3:50a.....	20-50	2.80	1.090	<i>.740</i>	<i>.652</i>	<i>.065</i>	-----		
2:57a.....	29-38	2.02	1.198	<i>.895</i>	<i>.633</i>	<i>.045</i>	-----		
2:50a.....	30-46	1.95	1.187	<i>.900</i>	<i>.636</i>	<i>.055</i>	-----		
2:01a.....	37-29	1.64	1.309	<i>.885</i>	<i>.749</i>	<i>.085</i>	-----		
0:17a.....	45-18	1.41	1.106	<i>.890</i>	<i>.773</i>	<i>.290</i>	-----		
0:11a.....	45-38	1.40	1.096	<i>.894</i>	<i>.779</i>	<i>.300</i>	-----		
Oct. 10									
4:36a.....	11-46	4.80	.673	<i>.658</i>	<i>.547</i>	<i>.180</i>	-----	284	
4:31a.....	12-41	4.47	.751	<i>.661</i>	<i>.549</i>	<i>.120</i>	-----		
4:04a.....	17-34	3.30	.940	<i>.736</i>	<i>.615</i>	<i>.160</i>	-----		
4:00a.....	18-16	3.17	.966	<i>.741</i>	<i>.618</i>	<i>.090</i>	-----		
3:15a.....	29-28	2.02	1.119	<i>.875</i>	<i>.688</i>	<i>.110</i>	-----		
3:11a.....	29-47	2.01	1.070	<i>.839</i>	<i>.691</i>	<i>.145</i>	-----	6	P=62.9%
Oct. 26									
2:50a.....	24-59	2.37	1.288	<i>.949</i>	<i>.780</i>	<i>.060</i>	-----		
2:50a.....	25-53	2.29	1.294	<i>.952</i>	<i>.782</i>	<i>.065</i>	-----		
1:04a.....	37-28	1.64	1.088	<i>.784</i>	<i>.639</i>	<i>.140</i>	-----	6	P=59.7%
1:00a.....	37-43	1.63	1.091	<i>.788</i>	<i>.642</i>	<i>.140</i>	-----		
2:57p.....	24-47	2.36	1.080	<i>.814</i>	<i>.658</i>	<i>.090</i>	-----		
3:04p.....	23-50	2.46	1.108	<i>.818</i>	<i>.661</i>	<i>.080</i>	-----		
3:31p.....	19-40	2.96	1.035	<i>.782</i>	<i>.644</i>	<i>.070</i>	-----		
3:35p.....	19-00	3.06	.987	<i>.788</i>	<i>.642</i>	<i>.080</i>	-----		

TABLE 4.—Summary of solar radiation intensity measurements made at the Blue Hill Meteorological Observatory, Milton, Mass., during October 1933

[ $I_m$ =total intensity;  $I_r$ =that transmitted by red filter;  $I_s$ =that by yellow filter]

Date and hour angle from solar noon	Solar altitude, h	Air mass, m	$I_m$	$I_r$	$I_s$	Sky conditions: clouds, haze (hz), smoke (smk), visibility (v), wind
Oct. 2						
2:10, p.m....	35 33	1.72	<i>gr. cal.</i> 1.161	<i>gr. cal.</i> 0.837	<i>gr. cal.</i> 0.662	
4:04, p.m....	18 26	3.11	1.001	.792	.690	Few Cist, 3 Cu; v 2; E-2.
Oct. 5						
2:48, a.m....	30 09	1.99	1.210	.886	.720	5 Ci; v 7; NE-5.
1:10, a.m....	41 08	1.52	1.341	.972	.734	3 Ci, few Cu; v 8-9; NE-5.
0:33, p.m....	43 11	1.46	1.350	.958	.734	3 Ci, Cist; v 8-9; NNE-5.
Oct. 8						
3:04, a.m....	18 24	3.14	1.292	.936	.734	
1:09, a.m....	39 24	1.57	1.390	.940	.765	1 Acu, Cu; v 9; W-4.
0:19, p.m....	41 41	1.50	1.380	.963	.738	Few Acu, Cu; v 9; W-4.
2:24, p.m....	31 48	1.89	1.316	.927	.724	
2:50, p.m....	28 08	2.12	1.246	.900	.700	Few Acu, Frcu; v 9; W-3.
Oct. 10						
2:41, a.m....	28 55	2.06	1.202	.904	.727	Few Acu; v 6-7; W-5.
1:13, a.m....	38 16	1.61	1.287	.945	.742	Few Ci, Cicu; v 7; W-5.
0:28, p.m....	40 43	1.53	1.292	.940	.747	Few Frcu; v 8-9; WSW-5.
3:00, p.m....	26 14	2.26	1.048	.788	.630	Few Cu, Frcu; v 8; W-6.
Oct. 11						
2:42, a.m....	28 30	2.09	1.238	.904	.724	2 Ci; v 7-8; W-4.
Oct. 12						
2:44, a.m....	27 54	2.13	1.064	.806	.652	No clouds; v 7; SSW-6.
2:52, p.m....	26 47	2.21	.909	.684	.536	1 Ci near sun; few Cu; v 7; WSW-6.
Oct. 14						
2:42, a.m....	27 32	2.16	1.264	.945	.752	Few Acu, Frcu, Cu; v 9; NW-4.
0:27, a.m....	39 15	1.58	1.412	.986	.774	Few Ci, Cicu; v 9; NW-4.
1:01, p.m....	37 43	1.63	1.395	1.012	.781	Few Ci, Cicu; v 9; NW-4.
2:30, p.m....	29 05	2.06	1.354	.968	.776	1 Ci; v 9; WNW-4.
Oct. 15						
2:25, a.m....	29 08	2.06	1.292	0.950	0.752	0 clouds; v 6-8; W-3.
0:10, a.m....	39 12	1.58	1.364	.954	.752	0 clouds; v 7-8; W-2.
1:26, p.m....	35 32	1.72	1.316	.954	.747	0 clouds; v 8; SW-3.
2:51, p.m....	26 00	2.28	1.190	.889	.675	0 clouds; v 9; SW-2.
Oct. 16						
1:07, a.m....	36 42	1.67	1.382	.994	.776	0 clouds; v 8; S-5.
Oct. 18						
2:32, a.m....	27 36	2.15	1.220	.904	.724	1 Cist; smk or hz; v 6-7; W-3.
0:52, a.m....	36 50	1.67	1.206	.878	.698	
0:03, a.m....	38 09	1.62	1.280	.918	.729	1 Cist over sun; 1 Cu; v 8; W-4.
Oct. 19						
2:42, a.m....	25 58	2.28	1.305	.963	.774	Few Ci, Cist over sun; v 9; NW-5.
1:00, a.m....	36 00	1.70	1.404	.976	.780	
1:17, p.m....	34 53	1.78	1.377	.994	.788	2 Cist, Ci; v 9-1; WNW-1.

TABLE 4.—Summary of solar radiation intensity measurements made at the Blue Hill Meteorological Observatory, Milton, Mass., during October 1933—Continued

[ $I_{\Sigma}$ —total intensity;  $I_r$ —that transmitted by red filter;  $I_y$ —that by yellow filter]

Date and hour angle from solar noon	Solar altitude, $h$	Air mass, $m$	$I_{\Sigma}$	$I_r$	$I_y$	Sky conditions; clouds, haze (hz), smoke (smk), visibility (v), wind
<b>Oct. 21</b>			<i>gr. cal.</i>	<i>gr. cal.</i>	<i>gr. cal.</i>	
2:28 a.m.	27 10	2.18	1.260	.927	.752	2 Ci, Cist, Cicu, few Freu; v 6; NE-3.
<b>Oct. 22</b>						
2:32 a.m.	25 07	2.35	1.292	.968	.774	0 clouds; v 9; WNW-5.
1:21 a.m.	31 50	1.89	1.352	.992	.796	
0:23 a.m.	35 04	1.74	1.418	1.022	.824	0 clouds; v 8-9; NW-3.
2:53 p.m.	22 25	1.61	1.215	.886	.722	Few Cist; v 8-9; N-3.
<b>Oct. 23</b>						
2:28 a.m.	24 44	2.38	1.350	1.035	.817	Few Steu; v 9-10; NNW-3.
0:07 p.m.	34 45	1.75	1.361	.968	.765	Few Ci; v 9; NW-3.
<b>Oct. 30</b>						
2:33 a.m.	24 02	2.45	1.048	.792	.650	
1:10 a.m.	31 43	1.90	1.197	.846	.684	1 Ci, 2 Cist; hz over sun; v 6-7; N-4.
<b>Oct. 31</b>						
1:05 a.m.	31 40	1.90	.904	.684	.549	Hz over sun; v 6; SW-2.
2:58 p.m.	20 24	2.85	.626	.503	.405	Few Ci; dense hz; v 6; WSW-2.

#### POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. J. F. Hellweg, Superintendent United States Naval Observatory. Data furnished by Naval Observatory, in cooperation with Harvard, Perkins, and Mount Wilson observatories. The differences of longitude are measured from central meridian, positive west. The north latitudes are plus. Areas are corrected for foreshortening and are expressed in millionths of sun's visible hemisphere. The total area, including spots and groups, is given for each day in the last column]

Date	Eastern stand- ard civil time	Hellographic			Area		Total area for each day
		Diff. long.	Longi- tude	Lati- tude	Spot	Group	
1933	<i>h</i> <i>m</i>	°	°	°			
Oct. 1 (Naval Observatory)	12 2		No spots				
Oct. 2 (Naval Observatory)	13 7		No spots				
Oct. 3 (Naval Observatory)	11 48		No spots				
Oct. 4 (Mount Wilson)	9 48		No spots				
Oct. 5 (Naval Observatory)	14 24		No spots				
Oct. 6 (Naval Observatory)	11 9		No spots				
Oct. 7 (Naval Observatory)	11 0		No spots				
Oct. 8 (Naval Observatory)	13 50		No spots				
Oct. 9 (Naval Observatory)	11 12		No spots				
Oct. 10 (Naval Observatory)	11 10		No spots				
Oct. 11 (Naval Observatory)	11 49		No spots				
Oct. 12 (Naval Observatory)	12 16		No spots				

Date	Eastern stand- ard civil time		Hellographic			Area		Total area for each day
			Diff. long.	Longi- tude	Lat- tude	Spot	Group	
	<i>h</i>	<i>m</i>	°	°	°			
Oct. 13 (Mount Wilson).....	11	20		No spots				
Oct. 14 (Naval Observatory).....	11	41		No spots				
Oct. 15 (Naval Observatory).....	11	42		No spots				
Oct. 16 (Naval Observatory).....	12	23		No spots				
Oct. 17 (Naval Observatory).....	12	14		No spots				
Oct. 18 (Naval Observatory).....	12	9		No spots				
Oct. 19 (Naval Observatory).....	10	39		No spots				
Oct. 20 (Naval Observatory).....	13	14		No spots				
Oct. 21 (Naval Observatory).....	12	11		No spots				
Oct. 22 (Naval Observatory).....	11	38		No spots				
Oct. 23 (Mount Wilson).....	9	50		No spots				
Oct. 24 (Mount Wilson).....	9	50		No spots				
Oct. 25 (Naval Observatory).....	11	51		No spots				
Oct. 26 (Naval Observatory).....	12	27	-2.0	89.5	+8.5		123	123
Oct. 27 (Naval Observatory).....	12	12	+12.0	90.4	+9.0		93	93
Oct. 28 (Naval Observatory).....	10	54	+25.0	91.0	+9.0		93	93
Oct. 29 (Naval Observatory).....	10	57	+38.0	90.7	+9.0		93	93
Oct. 30 (Naval Observatory).....	12	19	+52.0	90.8	+8.0		62	62
Oct. 31 (Naval Observatory).....	12	5	+66.0	91.7	+7.5		46	46
Mean daily area for October.....								16

#### PROVISIONAL SUN-SPOT RELATIVE NUMBERS FOR OCTOBER 1933

(Dependent alone on observations at Zurich and its station at Arosa)

[Data furnished through the courtesy of Prof. W. Brunner, Eidgenössische Sternwarte, Zurich, Switzerland]

October 1933	Relative numbers	October 1933	Relative numbers	October 1933	Relative numbers
1	0	11	0	21	0
2	0	12		22	0
3	0	13		23	0
4	0	14	0	24	0
5	0	15	0	25	0
6	0	16	0	26	Mc9
7	0	17	0	27	20
8	0	18	0	28	19
9		19	0	29	14
10	8	20	0	30	14
				31	12

Mean: 28 days=3.4.

Mc=New formation of a center of activity; M, in the central zone.

#### AEROLOGICAL OBSERVATIONS

[Aerological Division, W. R. Gregg, in charge]

By L. T. SAMUELS

There was considerable variation this month in the free-air temperature departures. They were greatest at Pembina (table 1) and negative at all levels, while at Omaha they were positive and of only slightly less magnitude. At the other stations the temperature departures were mostly of small-to-moderate magnitude with the signs varying considerably. Large positive departures occurred in the lower levels at Dallas and in the upper levels at Boston.

In practically all cases the relative humidity departures were of opposite sign to those for temperature except at

San Diego, where positive departures for both of these elements prevailed.

Resultant free-air winds for October were close to normal both in direction and velocity at most stations and levels (table 2). Exceptions to this occurred, however, at Pembina and Omaha, referred to above in connection with marked differences in temperature departures. At Pembina the resultant velocities were below normal while at Omaha they exceeded the normal. The resultant directions were normal at both stations.